

CLAIMS

What is claimed is:

1. An apparatus for extracting, transporting and/or releasing liquid or semi-liquid material, said apparatus comprising:
 - (a) a container;
 - (b) an inlet/outlet disposed beneath the container when the apparatus is in its operational orientation, for allowing material to enter and exit the apparatus;
 - 10 (c) a gateway disposed between the container and the inlet/outlet, the gateway comprising an enclosed channel that has an interior surface; and
 - (d) pressure-control means for controlling air pressure within the container,
- 15 wherein in tracing a pathway through the enclosed channel of the gateway, starting from the inlet/outlet side of the gateway and ending at the container side of the gateway, with the apparatus in its operational position, the pathway first passes above a first point on the interior surface of the enclosed channel and then underneath a second point on the interior surface of the 20 enclosed channel,
- wherein the first point is higher than the second point with the apparatus in its operational position, and
- wherein the inlet/outlet has a minimum dimension that is at least $\frac{1}{4}$ inch in length.
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2. An apparatus according to claim 1, wherein the gateway is disposed in close proximity to the inlet/outlet.
3. An apparatus according to claim 1, wherein the pressure-control 30 means comprises a pump for pumping air out of the container.

4. An apparatus according to claim 1, wherein the pressure-control means comprises a valve configured to control an opening between the container and ambient air.

5 5. An apparatus according to claim 1, wherein the container is flexible.

6. An apparatus according to claim 1, wherein the gateway comprises a rigid fitting.

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7. An apparatus according to claim 1, wherein the gateway comprises an S-shaped tube.

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8. An apparatus according to claim 1, wherein the pressure-control means connects to the container via a flexible hose of at least 25 feet in length.

9. An apparatus according to claim 8, wherein the flexible hose is at least 50 feet in length.

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10. An apparatus according to claim 8, wherein the flexible hose encloses a pneumatic hose.

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11. An apparatus according to claim 8, wherein the apparatus, from and including the flexible hose to and including the inlet/outlet, is at least 35 feet in length.

12. An apparatus according to claim 11, wherein the apparatus, from and including the flexible hose to and including the inlet/outlet, is substantially entirely flexible.

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13. An apparatus according to claim 1, further comprising separator means disposed between the inlet/outlet and the gateway for collecting solids.

14. An apparatus according to claim 13, wherein the separator means comprises a vertically extending first tube enclosed within a vertically extending second tube, wherein the first tube is open at its top, and wherein the second tube has a bottom surface for collecting material that spills out of the top of the
5 first tube.

15. An apparatus according to claim 13, wherein at least a portion of the separator means is readily detachable and re-attachable for emptying material that collects in the separator means.

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16. An apparatus according to claim 14, wherein both the first tube and the second tube are flexible.

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17. An apparatus according to claim 1, wherein the inlet/outlet has a minimum dimension that is at least $\frac{1}{2}$ inch in length.

18. An apparatus according to claim 1, wherein the inlet/outlet has a minimum dimension that is at least $\frac{3}{4}$ inch in length.

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19. An apparatus according to claim 1, wherein the inlet/outlet has a minimum dimension that is at least 1 inch in length.

20. An apparatus according to claim 1, wherein the inlet/outlet has a minimum dimension that is at least $1\frac{1}{2}$ inch in length.

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21. An apparatus according to claim 1, wherein the inlet/outlet has a minimum dimension that is at least 2 inches in length.

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22. An apparatus according to claim 1, wherein the inlet/outlet has a minimum dimension that is at least 4 inches in length.

23. A method for extracting material from a well, comprising steps of:

(a) obtaining an extraction apparatus that includes:

(i) a container;

- (ii) an inlet/outlet disposed beneath the container when the extraction apparatus is in its operational orientation, for allowing material to enter and exit the extraction apparatus;
- (iii) a gateway disposed between the container and the inlet/outlet, the gateway comprising an enclosed channel that has an interior surface;
- (iv) air-pressure control means for controlling an amount of air within the container; and
- (v) a flexible hose connecting the air-pressure control means to the container,
- wherein when tracing a pathway through the enclosed channel of the gateway, starting from the inlet/outlet side of the gateway and ending at the container side of the gateway, with the extraction apparatus in its operational position, the pathway first passes above a first point on the interior surface of the enclosed channel and then underneath a second point on the interior surface of the enclosed channel, the first point being higher than the second point;
- (b) lowering the inlet/outlet of the extraction apparatus into a well until the inlet/outlet has been submerged into a pool of material to be extracted, the pool of material being at least 35 feet beneath a top edge of the well;
- (c) upon completion of step (b), using the air-pressure control means to evacuate air from the container through the flexible hose, thereby causing the material to be pushed upwardly through the inlet/outlet, through the gateway and into the container;
- (d) subsequent to step (c), withdrawing the inlet/outlet from the well; and
- (e) subsequent to step (d), causing air to enter the container, thereby causing the material to empty out of the container through the gateway and the inlet/outlet.

24. A method according to claim 23, further comprising a step of repeating steps (b)-(e) at least one additional time.

25. A method according to claim 23, wherein the gateway comprises an S-shaped tube.

26. A method according to claim 23, wherein the flexible hose encloses
5 a pneumatic hose.

27. A method according to claim 23, wherein the flexible hose is at least 25 feet in length

10 28. A method according to claim 23, wherein the flexible hose is at least 50 feet in length.

15 29. A method according to claim 23, wherein the extraction apparatus, from and including the flexible hose to and including the inlet/outlet, is at least 50 feet in length.

30. A method according to claim 23, wherein the extraction apparatus, from and including the flexible hose to and including the inlet/outlet, is substantially entirely flexible.

20 31. A method according to claim 23, wherein the extraction apparatus further comprises separator means disposed between the inlet/outlet and the gateway for collecting solids.

25 32. A method according to claim 31, wherein the separator means comprises a vertically extending first tube enclosed within a vertically extending second tube, wherein the first tube is open at its top, and wherein the second tube has a bottom surface for collecting material that spills out of the top of the first tube.

30 33. A method according to claim 31, further comprising steps of:
(c1) causing air to enter the container, thereby causing the material to empty out of the container through the gateway and the inlet/outlet; and

(c2) using the air-pressure control means to evacuate air from the container through the flexible hose, thereby causing the material to be pushed upwardly through the inlet/outlet, through the gateway and into the container,

5 with said steps (c1) and (c2) being performed subsequent to step (c), but prior to step (d), thereby causing additional filling of the separator means with solids prior to performing step (d).

10 34. A method according to claim 33, further comprising a step of waiting between step (c) and step (c1) for the solids to fall below the top of the first tube.

15 35. An apparatus for extracting, transporting and/or releasing material, said apparatus comprising:

- 20 (a) a container;
(b) an inlet/outlet disposed beneath the container when the apparatus is in its operational orientation, for allowing material to enter and exit the apparatus;
(c) a separator that is disposed between the inlet/outlet and the container and that includes a vertically extending first tube enclosed within a vertically extending second tube, wherein the first tube is open at its top, and wherein the second tube has a bottom surface for collecting material that spills out of the top of the first tube; and
25 (d) air-pressure control means for controlling an amount of air within the container.

30 36. An apparatus according to claim 35, wherein the air-pressure control means connects to the container via a flexible hose.

37. An apparatus according to claim 36, wherein the apparatus, from and including the flexible hose to and including the inlet/outlet, is at least 35 feet in length and is substantially entirely flexible.

38. An apparatus according to claim 36, wherein the flexible hose encloses a pneumatic hose.

39. An apparatus according to claim 35, wherein at least a portion of
5 the second tube is readily detachable and re-attachable for emptying material that collects in the separator.

40. A method for extracting material from a well, comprising:

(a) obtaining an extraction apparatus that includes:

10 (i) a container;

(ii) an inlet/outlet disposed beneath the container when the apparatus is in its operational orientation, for allowing material to enter and exit the apparatus;

15 (iii) a separator disposed between the inlet/outlet and the container that includes a vertically extending first tube enclosed within a vertically extending second tube, wherein the first tube is open at its top, and wherein the second tube has a bottom surface for collecting material that spills out of the top of the first tube; and

20 (iv) air-pressure control means for controlling an amount of air within the container;

(b) lowering the inlet/outlet of the extraction apparatus into a well until the inlet/outlet has been submerged into a pool of material to be extracted, the pool of material being at least 35 feet beneath a top edge of the well;

25 (c) upon completion of step (b), using the air-pressure control means to evacuate air from the container, thereby causing the material to be pushed upwardly through the inlet/outlet, through the separator and into the container; and

30 (d) subsequent to step (c), withdrawing the inlet/outlet from the well.

41. A method according to claim 40, further comprising steps of:

- (c1) causing air to enter the container, thereby causing the material to empty out of the container through the separator and the inlet/outlet; and
 - (c2) using the air-pressure control means to evacuate air from the container, thereby causing the material to be pushed upwardly through the inlet/outlet, through the separator and into the container,
- 5 with said steps (c1) and (c2) being performed subsequent to step (c), but prior to step (d), thereby causing additional filling of the separator with solids
- 10 prior to performing step (d).

15 42. A method according to claim 41, further comprising a step of waiting between step (c) and step (c1) for the solids to separate out of the material.

43. A method according to claim 40, wherein at least a portion of the second tube is readily detachable and re-attachable for emptying material that collects in the separator.

20 44. A method according to claim 40, wherein the air-pressure control means connects to the container via a flexible hose.

25 45. A method according to claim 44, wherein the extraction apparatus, from and including the flexible hose to and including the inlet/outlet, is at least 35 feet in length and is substantially entirely flexible.

46. An apparatus for extracting, transporting and/or releasing liquid or semi-liquid material, said apparatus comprising:

- (a) a container;
- 30 (b) an inlet/outlet disposed beneath the container when the apparatus is in its operational orientation, for allowing material to enter and exit the apparatus;

- (c) a gateway disposed between the container and the inlet/outlet, the gateway comprising an enclosed channel that has an interior surface; and
- (d) pressure-control means for controlling air pressure within the container,

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wherein in tracing a pathway through the enclosed channel of the gateway, starting from the inlet/outlet side of the gateway and ending at the container side of the gateway, with the apparatus in its operational position, the pathway first passes above a first point on the interior surface of the enclosed channel and then underneath a second point on the interior surface of the enclosed channel,

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wherein the first point is higher than the second point with the apparatus in its operational position, and

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wherein the inlet/outlet has a size and a shape such that a vacuum alone would not be sufficient to prevent water from falling out of the inlet/outlet.

47. An apparatus for extracting, transporting and/or releasing liquid or semi-liquid material, said apparatus comprising:

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- (a) a container;
- (b) an inlet/outlet disposed beneath the container when the apparatus is in its operational orientation, for allowing material to enter and exit the apparatus;
- (c) a gateway disposed between the container and the inlet/outlet, the gateway comprising an enclosed channel that has an interior surface; and
- (d) pressure-control means coupled to the container for controlling air pressure within the container,

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wherein in tracing a pathway through the enclosed channel of the gateway, starting from the inlet/outlet side of the gateway and ending at the container side of the gateway, with the apparatus in its operational position, the pathway first passes above a first point on the interior surface of the enclosed channel and then underneath a second point on the interior surface of the enclosed channel,

wherein the first point is higher than the second point with the apparatus in its operational position, and

wherein the pressure-control means comprises at least one of an electrically or mechanically actuated pump or valve.